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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,638	04/22/2004	Kevin J. Torek	MICRON.096C1	7034

20995 7590 06/15/2006

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/829,638	TOREK ET AL.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on 4/5/2006 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of application 10/847, 222 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4, 5, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Bergman.

Bergman et al teaches a wafer processing chamber 15 with an ozone rich environment. Bergman et al further teaches a sprayer 40, pumping mechanism 55 (pulsating fluid source), a rotator 30.

Note Figs. 1 and 2 illustrate a gap created by rotation and the presence of processing fluid between the cassette (broadly interpreted as wafer support) and the wafer. Rotor assembly 30 is provided so that the wafers 20 are spun during treatment, see col. 4 lines 21-29. A gap (broadly interpreted by a space between wafer and support) inherently exists between the wafer and rotator to include supports 25 in order to ensure treatment of the wafer by the fluid on all

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surfaces including the wafer edges. The wafer is located between the sprayers 40 and the rotator 30.

Regarding the pulsating fluid source limitation this claim has been broadly interpreted as a means of controlling the duration and amount of fluid sprayed onto the wafer which is inherently performed by a pump, see col. 6 lines 18-48 wherein the spray amount is controlled regarding duration and amount dependent upon the process desired.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman et al (6,273,108) in view of Erk et al (US 5,593,505).

Regarding claim 2:

Bergman et al fails to teach that the cassette remains stationary while rotating.

Erk et al teaches cleaning wafer using sonic energy. Erk et al further teaches a rotator wherein a cassette is stationary, see co. 6 lines 50-55. The motivation to modify the apparatus of Bergman et al with the rotator of Erk et al is that the carrier provides ample support to the wafer despite the rotation of the wafer.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Bergman et al to include the rotator of Erk et al.

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Regarding claim 3: Claim 6 of Erk et al teaches that the wafer is rotated at 8 rpm, which is less than 100 rpm. In col. 6 lines 25-35, Erk et al teaches that the velocity at which the wafers are rotated allows for rapid cleaning which makes the process efficient. The velocity of rotation is a result effective variable commonly determined by routine experimentation. Conducting routine experimentation would result in determining the optimal velocity to rotate the wafers to produce the best cleaning result obvious to one of ordinary skill in the art.

Thus it would have been obvious for one of ordinary skill to rotate the wafers at an optimal velocity in order to produce the desired cleaning result.

6. Claims 6, 10-14, 17, 18, 22-27, and 29-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman et al in view of Dautartas et al (US 6,124,158).

The apparatus of Bergman a pump in brief and fails to teach specifics about the pulsating fluid source.

Dautartas et al teaches a semiconductor apparatus wherein pulsed valves selectively pulse fluid through a sprayer see col.4 lines 24-27 and col.5 lines 14-20. The motivation to include the pulsed valves of Dautartas et al is that they provide enhanced flow control, increased efficiency and reliability. Thus, it would have been obvious at the time of the claimed invention to modify the apparatus of Bergman et al in view of the pulsed valves of Dautartas et al.

Regarding claims 6,10, 13: Dautartas et al teaches the frequency of pulsing in cols. 5 and 6.

Regarding claims 11-13 and 29: The cassette of Erk et al is configured to hold a plurality of wafers see Fig.1. Note wafers are positioned between the rotator and sprayer in Bergman et al.

Regarding claims 14: Dautartas et al discloses that the ozone pulses from 1 to 10 seconds see col. lines 5-15.

Regarding claim 27: Figs. 1, 2, 4, and 5 of Bergman et al illustrates a plurality of nozzles.

5. Claims 16, 19, 28, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman et al in view of Dautartas et al as applied to claims 6, 10-14, 17, 18, 22-27, and 29-36 above, and further in view of Erk et al.

Regarding claims 16 and 28: The teachings of Bergman et al and Dautartas were discussed above. Both fail to teach temperature of the solution.

Erk et al teaches the bath (chamber) temperature is 60deg. C. The temperature of the chamber is a known optimizable parameter known to depend upon the type of solution and the desired process result. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to maintain an optimal temperature of the chamber that would result in the desired cleaning result.

Regarding claim 19: Claim 6 of Erk et al teaches that the wafer is rotated at 8 rpm, which is less than 100 rpm. In col. 6 lines 25-35, Erk et al teaches that the velocity at which the wafers are rotated allows for rapid cleaning which makes the process efficient. The velocity of rotation is a result effective variable commonly determined by routine

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experimentation. Conducting routine experimentation would result in determining the optimal velocity to rotate the wafers to produce the best cleaning result obvious to one of ordinary skill in the art.

Regarding claim 37: Erk et al teaches cleaning wafer using sonic energy. Erk et al further teaches a rotator wherein a cassette is stationary, see co. 6 lines 50-55. The motivation to modify the apparatus of Bergman et al modified by Dautartas et al with the rotator of Erk et al is that the carrier provides ample support to the wafer despite the rotation of the wafer.

9. Claims 16, 19, 28, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman et al in view of Dautartas et al as applied to claims 6, 10-14, 17, 18, 22-27, and 29-36 above, and further in view of de Boer et al (US 5,902,407).

The teachings of Bergman et al and Dautartas et al were discussed above.

Both fail to teach a rotator that rotates the wafers at a plurality of speeds.

DeBoer et al teaches a rotatable substrate support wherein a variable speed motor is provided to the substrate support to allow variation in support rotation. The motivation to introduce the variable speed motor of DeBoer et al into the apparatus of Bergman as modified by Dautartas et al is that the ability to control the speed of rotation will enhance the overall control of the wafer handling in the treatment process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to introduce the variable speed motor of DeBoer et al into the apparatus of Bergman as modified by Dautartas et al.

10. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman in view of Schrandt (US 5,695,092).

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The teachings of Bergman et al were discussed above . Bergman et al teaches a pump 55 is connected to the fluid source. Pumps are art recognized suitable means of mass transport and known to provide steady flow or periodic/pulsating flow.

Bergman et al fails to teach the duty cycle of the pulsating fluid source (pump).

Schrandt teaches that pumps can be controlled to produce a desired duty cycle that will provide the mass flow necessary or optimal for the process. The motivation to modify the apparatus of Bergman et al to provide a pump with the duty cycle to provide the optimal amount of solution to the cleaning process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the proper duty cycle that will yield the optimal mass flow that will enhance the cleaning process of the wafers.

11. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman et al in view of Dautartas et al as applied to claims 6, 10-14, 17, 18, 22-27, and 29-36above, and further in view of Schrandt (US 5,695,092).

The teachings of Bergman et al as modified by Dautartas et al. The combined teachings of Bergman and Dautartas et al fails to teach the duty cycle of the pulsating fluid source (pump).

Schrandt teaches that pumps can be controlled to produce a desired duty cycle that will provide the mass flow necessary or optimal for the process. The motivation to modify the apparatus of Bergman et al to provide a pump with the duty cycle to provide the optimal amount of solution to the cleaning process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the proper duty cycle that will yield the optimal mass flow that will enhance the cleaning process of the wafers.

Conclusion

Response to Arguments

12. Applicant's arguments filed 4/5/2006 have been fully considered but they are not persuasive. Applicant has introduced arguments regarding the prior art of Bergman not anticipating a pulsating fluid source or a rotator with a gap created between a wafer and the wafer cassette. Neither of the arguments is regarding structural limitations but are based upon process limitations that can inherently be performed by the prior art of Bergman. The present invention as claimed broadly requires a process chamber, a means to rotate a wafer, a spray, and a means to control the spray (pulsing in terms of duration and amount). The examiner fails to see how the present invention differs from the prior art of Bergman as claimed as thus has maintained the rejections from the previous office action.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

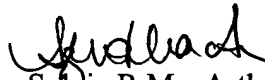
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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438.

The examiner can normally be reached on M-F during the hours of 8:30 a.m. and 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sylvia R MacArthur
Patent Examiner
Art Unit 1763

June 8, 2006


PARVIZ HASSANZADEH
SUPERVISORY PATENT EXAMINER